

cancellation filter is adjustable in a frequency range
lying below a first cut-off frequency and the gain of
the echo cancellation filter is adjustable in a
frequency range lying above a second cut-off frequency,
5 by the control circuit.

In this case, the two cut-off frequencies of the echo
cancellation filter are preferably likewise adjustable
by the control circuit.

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Preferred embodiments of the programmable echo
cancellation filter according to the invention are
described below with reference to the accompanying
figures in order to elucidate features that are
15 essential to the invention.

In the figures:

Figure 1 shows a transceiver with echo cancellation
20 filter according to the prior art;

Figure 2 shows a transceiver of fully differential
construction with a fully differential echo
cancellation filter according to the invention;

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Figure 3 shows the circuitry construction of a
preferred embodiment of the programmable echo
cancellation filter according to the invention;

30 Figure 4 shows the circuitry construction of a
programmable resistor circuit, as is incorporated in
the echo cancellation filter according to the
invention;

35 Figure 5 shows the frequency profile of the
programmable echo cancellation filter according to the
invention.

As can be seen from figure 2, the transceiver 1 contains a data source 2 for emitting transmission data to a digital/analog converter 3, which converts the transmission data into an analog transmission signal and emits it to an analog transmission filter 4. The filtered analog transmission signal is amplified by a line driver 5 and emitted to line terminals 7a, 7b via a hybrid circuit 6. Connected to the line terminals 7a, 7b is a signal line, for example a two-wire telephone line, which transmits the transmission signal to a subscriber terminal device. The hybrid circuit 6 contains two resistors 8a, 8b. At nodes 9a, 9b, the transmission signal emitted by the driver circuit 5 is branched off via lines 10a, 10b, to a signal matching circuit 11, which carries out prefiltering and signal amplitude matching. The signal matching circuit 11 is connected via lines 12a, 12b to signal inputs 13a, 13b of a programmable echo cancellation filter 14 according to the invention. The echo cancellation filter 14 is preferably of fully differential construction and has two signal outputs 15a, 15b connected via lines 16a, 16b to summation nodes 17a, 17b in the reception signal path of the transceiver 1. Furthermore, the programmable echo cancellation filter 14 according to the invention has a control input 18 connected via control lines 19 to an output 20 in a control circuit 21.

The control circuit 21 is preferably a digital signal processor. The DSP signal processor 21 carries out the settings in the echo cancellation filter 14 according to the invention via the control line 19.

The reception signal arriving via the terminals 7a, 7b is fed together with the echo signal that occurs via signal lines 22a, 22b to a further signal matching circuit 23. The signal matching circuit 23 prefilters the incoming signal and carries out signal amplitude

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matching. On the output side, the signal matching circuit 23 is connected via lines 24a, 24b to input resistors 25a, 25b of an automatic signal gain control circuit AGC. The resistors 25a, 25b are connected to signal inputs 27a, 27b of an operational amplifier 28 via lines 26a, 26b. The operational amplifier 28 has two signal outputs 29a, 29b, which are connected to a filter 31 via lines 30a, 30b. Connected downstream of the filter 31 is an analog/digital converter circuit 32, which converts the filtered reception signal into a digital reception signal and emits it to a data sink 33 of the transceiver 1. The signal output 29a of the operational amplifier 28 is connected via a feedback resistor 34a to the noninverting signal input 27a of the operational amplifier 28. The second signal output 29b of the operational amplifier 28 is connected via a feedback resistor 34b to the inverting signal input 27b of the operational amplifier 28.

Figure 3 shows the circuitry construction of a particularly preferred embodiment of the programmable echo cancellation filter 14 according to the invention. The echo cancellation filter 14 is of fully differential construction in the embodiment illustrated in figure 3. The echo cancellation filter 14 has a signal input 13a, 13b for receiving the matched transmission signal emitted by the transceiver 1. The signal input 13a, 13b is connected via lines 35a, 35b, input resistors 36a, 36b and lines 37a, 37b to the two signal inputs 38a, 38b of an operational amplifier 39 of fully differential construction. The operational amplifier 39 of fully differential construction has two supply voltage terminals 40a, 40b and is supplied with the supply voltage U_v of the transceiver 1. The operational amplifier 39 has two signal outputs 41a, 41b, which are connected via lines 42a, 42b to output resistors 43a, 43b of the operational amplifier 39. At nodes 44a, 44b, the signal outputs 41a, 41b of the